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Islamic Inheritance Law, Son Preference and Fertility Behavior of Muslim Couples in Indonesia

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Abstract

This paper examines whether the son preference and fertility behavior of Muslim couples respond to the risk of inheritance expropriation by their extended family. According to traditional Islamic inheritance principles, only the son of a deceased man can exclude his male agnates from inheritance and preserve his estate within the nuclear household. The paper exploits cross-sectional and time variation in the application of the Islamic inheritance exclusion rule in Indonesia: between Muslim and non-Muslim populations affected by different legal systems, across men with different sibling sex composition, and before and after a change in Islamic law that allowed female children to exclude male relatives. The analysis finds that Muslim couples more affected by the exclusion rule exhibit stronger son preference, practice sex-differential fertility stopping, attain a higher proportion of sons, and have larger families than non-Muslims or Muslims for whom the exclusion rule is less binding.

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1. Introduction

Studies on differential fertility by religion observe that Muslim-majority countries as well Muslim minorities in certain countries report the highest fertility rates. Muslims tend to desire more children and are less likely to use contraception than non-Muslims. Differences in fertility levels between these groups hold to a significant extent even after controlling for contributing social and demographic factors (Chamie 1981, Chaudhry 1996, Moulasha and Rao 1999, Jeffery and Jeffery 2002, Morgan et al. 2002, Dharmalingam and Morgan 2004, Westoff and Frejka 2007). However the decline in fertility rates in some Islamic countries undermines the view that doctrinal opposition prevents Muslims from pursuing family planning (Mazrui 1994, Hull and Hull 1997, Rashad 2000, Karim 2004, Jones and Karim 2005). In fact, diverse theological stances on Islamic texts accept the prevention of pregnancy as long as there is no permanent impairment of fertility (Allman 1978). Current knowledge suggests that explanations for Muslim/non-Muslim fertility differences may lie elsewhere.

This study contributes to the literature by identifying an economic source of differences in son-preferred fertility-stopping behavior and fertility outcomes between Muslim and non-Muslim populations. Religion can influence reproductive behavior not only directly, by discouraging the use of contraception or encouraging large family size, but also indirectly, by specifying the marriage practices and regulating family relations. In this study, I draw attention to a specific institutional feature of Islam: the Koranic inheritance exclusion rule.

Two central elements of Islamic inheritance are that family wealth is transferred along a male line, and that a surviving son excludes a deceased man's brothers and male agnates from accessing his wealth. I claim that the tension created by this rule, between the nuclear and extended family, provides economic incentives for son-preference and high fertility. I argue that in the attempt to secure a surviving male child, couples engage in differential fertility stopping behavior (DSB). Muslim couples in which the man has a surviving brother and who have had mainly daughters are more likely to face greater

incentives to continue childbearing. The explanation offered is consistent with theoretical arguments and empirical evidence that have shown that the desire to have sons can alter the actual sex composition of children and the size of a family (Chowdhury and Biragi 1990, Nag 1991, Arnold 1997, Basu and De Jong 2007, Filmer et al. 2009).

To explore the effect of the Islamic inheritance law, this paper studies Indonesian Muslim and non-Muslim couples' total fertility and children sex composition. Indonesia is the fourth most populous country in the world (225.6 million in 2007) and the world's largest Muslim nation (78 percent). In Indonesia, a civil legal system regulates all economic and social interactions of all population groups; but a parallel Islamic legal system has jurisdiction over all cases of Muslim family law, including inheritance. In 1994, during a process of compilation and codification of the Islamic legal principles, the Indonesian Supreme Court modified the Islamic inheritance exclusion rule and allowed daughters to exclude the deceased's male relatives. This context offers an opportunity to study the causal effects of the inheritance exclusion rule on son-preference and fertility outcomes.

In order to identify the influence of the Islamic inheritance law on the ideal and actual child-gender composition and family size, I perform a difference-in-difference-in-difference estimation. I exploit cross-sectional variation in religious affiliation and cross-sectional and time variation in the application of the inheritance exclusion rule. I compare fertility outcomes between Muslim and non-Muslim couples (first difference), between couples in which the man has and does not have at least one surviving brother (second difference), before and after the exclusion rights were extended to daughters (third difference). Only the application of the inheritance rule is expected to vary between Muslim and non-Muslim couples, between Muslim men who have at least one surviving brother and Muslim men who have no siblings or only sisters, and between Muslim couples who had earlier or later exposure to the modified Islamic inheritance law. Conditional on demographics, location and time fixed effects, other variables that could have an influence on the outcomes of interest are expected to apply equally to all groups.

I obtain couple-level and child-level estimates of the effect of the inheritance law on fertility behavior. In couple-level regressions, I find that son preference is not general among Muslim couples but limited to those who are expected to have a stronger motivation to seek a son. Muslim couples in which the man has at least one surviving brother and who started childbearing before the change in the Islamic inheritance law desire a 0.12 higher fraction of sons than similar non-Muslim couples. Once the inheritance exclusion rights are extended to daughters, their ideal proportion of sons declines by 0.13. As the result of weakened incentives for son-preference they have a 0.60 lower proportion of sons and 3.11 fewer children, and they are 88 percent less likely to exceed their ideal fertility in the post-period relative to the pre-period. Moreover, a negative relationship between the proportion of sons and family size, conditional on the characteristics associated with the inheritance rule, provides evidence of DSB among couples for whom the inheritance rule is binding.

In child-level regressions, I explore additional effects of DSB and of the inheritance exclusion rule. Child-level regressions allow examining the progressive adjustment of fertility outcomes in response to changes in the father's sibling composition and the inheritance law. Conditional on child gender, children born to men who had a surviving brother at the time of starting childbearing have more siblings and higher order of birth if they are Muslim rather than non-Muslim. However, a reduction in the number of siblings and order of birth is observed among Muslim children born after the compilation whose father had a surviving brother at the time of their birth. I find no significant differences in the number of siblings and relative birth order of boys and girls; but a strongly significant decline of the proportion of male children with sibling size provides evidence of DSB.

Finally, in a placebo test, I examine whether couples who do not have substantial assets exhibit the differential effects by religion, sibling composition and time that characterize the application of the inheritance exclusion rule. I find that the positive relationship between son preference and fertility outcomes and the interaction of Muslim men who have at least one surviving brother is observed only among couples who own their

dwelling. The insignificant effects estimated on the sample of non-home owners suggest that potential confounders are not a treat for identification.

The finding that the fertility of Indonesian Muslims responds to incentives for son-targeting is surprising because Indonesia is famed for balanced sex ratios and moderately low fertility levels. However, the apparent conflict has a simple explanation. First, only Muslims for whom the inheritance rule is binding have incentives for son preference and practice son-preferred DSB. Second, DSB does not have an influence on the aggregate sex composition of children or the aggregate fertility rate (Clark 2000). Finally, in Indonesia, modern and permanent contraceptive use is high, and this significantly increases the early enforcement of differential stopping (Basu and De Jong 2007).

The remainder of this paper is organized as follows. Section 2 offers a background on the classic Islamic inheritance law and the Indonesian legal system. It discusses the incentives for son preference and its expected effect on fertility outcomes. Section 3 describes the identification strategy and the data. Section 4 establishes that the Islamic inheritance exclusion rule has an influence on son and fertility preferences. It also presents evidence of son-preferred differential stopping behavior and of higher fertility among couples who have stronger incentives for seeking a son. Section 5 offers additional child-level evidence of the effects of sex-differential fertility stopping behavior and of the inheritance exclusion rule. Section 6 presents a placebo test of the effect of the Islamic inheritance exclusion rule on a sample of couples who do not own housing. Section 7 concludes.

2. Islamic inheritance, incentives for son preference and fertility outcomes

To motivate the empirical work, in this section I provide an overview of the classic Islamic inheritance principles and the change introduced by the Indonesian compilation of Islamic laws. Next, I describe the inheritance incentives for son preference in the

broader Indonesian legal system and discuss their potential effects on the gender composition and fertility outcomes of Muslim and non-Muslim populations.

2.1. Islamic inheritance rules and the Indonesian compilation of Islamic laws

Muslim inheritance legislations are derived from a comprehensive and detailed structure set out in the Koran and the Hadith.[1] The inheritance principles found in these books cater a wide range of beneficiaries and outline how to distribute the estate among the heirs under various scenarios. Given the complexity of the principles found in religious sources, Muslim societies have elaborated inheritance rules that allow the allocation of wealth in a more precise and systematic fashion. The systematization of Islamic inheritance rules is based on jurisprudential methods. As a result, the inheritance rules differ between Shiite and Sunni schools of law and across Muslim countries.[2] However, Koranic principles regarding the designated heirs, their shares and their order of priority are the common basic denominator.[3]

A basic Koranic principle, present in all Islamic inheritance laws, is the rule that only a male descendant (son or son's son) can exclude male ascendants (paternal grandfather, uncles, brothers or nephews) from the distribution of wealth. In the absence of a son, the full balance of the estate goes to the deceased's brother or the nearest adult male. Female children cannot exclude these residual heirs. Although girls are primary heirs, their inheritance right is conditional on the presence of a male child because their shares are defined relative to an equivalent male share. Lifetime transfers, bequests and family endowments are allowed, but they are restricted to only one-third of an individual's estate and require the agreement of all heirs. Therefore, they cannot be used to avoid the compulsory inheritance exclusion rule.

[1] The Hadith are narrations concerning the teachings and deeds of Muhammad. They are used as a basis of Islamic law and are regarded as matters of jurisprudence. The two main Islamic denominations, Shiites and Sunnis have different sets of Hadith.
[2] Muslim societies have adapted these rules from either the Shiite or Sunni schools of law, have combined both, or have new developed rules based on traditional jurisprudence.
[3] Three verses in the fourth chapter of the Koran concern inheritance: An-Nisaa 11, 12 and 176.

Around the Muslim world, the exclusion of male agnates by a surviving son and other inheritance rules that arise directly from explicit Koranic principles are not subject to independent reasoning and not readily open to modification (Powers 1993, Cammack 2007). Nevertheless, a major departure from the Islamic customary practice regards the interpretation of the word "*walad*" (child) in the Indonesian Islamic law, which has implications for the right of agnatic siblings and male relatives to inherit.

Between the late 1980s and early 1990s, Indonesia compiled and codified its Islamic laws to reduce jurisprudence to a series of rules to be followed by all Muslim jurists. Until then, Indonesian Muslim jurists would simply cite a principle of customary law or offer a new interpretation of a relevant passage from scripture. During the compilation process, the examination of the *Surah an-Nisa 4:176* of the Koran led the Indonesian Supreme Court to enforce the right of female children to exclude male collaterals. According to the verse, collateral relatives inherit in the absence of a "*walad*" of the deceased. In other verses the Arabic word "*walad*" was interpreted as a child of either sex, but a majority of Sunni scholars and jurists had interpreted verse 176 as referring to male children only. In 1994, the Supreme Court ordered the consistent use of the term as referring to both male and female children (Cammack 1999a 1999b, Lukito 2006).

Islamic communities in general are familiar with basic inheritance law, and Indonesian Muslims have a good understanding of the changes that took place during the compilation process (Bowen 1996). Although inheritance disputes are not common, court cases are followed and receive attention within the family when deciding or debating inheritance matters (Cammack and Feener 2007).

2.2. Differential incentives for son preference and high fertility in Indonesia

Indonesia has a mixed legal system in which Islamic law coexists with Western civil law. The jurisdiction of Islamic legislation includes only cases of Muslim family law. Instead, civil legislation regulates different aspects of economic, political and social activity for all population groups.

Within classic Islamic inheritance law, Muslim men who have a surviving brother are exposed to a higher risk of estate expropriation by their lateral relatives than Muslim men who have no siblings or only sisters. For them, securing a surviving son allows preserving the transfer of wealth within the nuclear family. This incentive to produce a son can affect their preference for child gender, the sex composition of their children and their family size.

The desire to have sons has been linked to large family size and excess fertility in several south Asian countries where abortion is limited (Chowdhury and Bairagi 1990, Das 1987). When pre-natal sex selection is not possible, couples with a strong preference for sons seek to affect their children's sex composition through sex-differential fertility stopping behavior. DSB keeps the fertility rates high because son-targeting couples are more likely to continue having children and exceed their ideal family size in their effort to have sons (Clark 2000).

Such motivation for son-targeting and high fertility is missing among non-Muslims, whose activities are regulated by the civil legal system. In contrast with the classic Islamic legal tradition, the Indonesian civil law has a gender-neutral position regarding inheritance. All children, male or female, together with their surviving parent are first in line to inherit. The gender of the heirs does not determines neither whether they receive a share of the estate nor the size of the share (Lukito 2006).

After the compilation, the Islamic inheritance law was brought into line with the civil law. The extension of inheritance exclusion rights to daughters eliminated the differential expropriation risk by sibling gender composition. Muslim couples who started childbearing in the pre-compilation period have only partial or no exposure to the modified Islamic inheritance rules. However, Muslim couples who started childbearing after the compilation have early or full exposure to the new legal regime and are not directly subject to inheritance incentives to prefer a son.

Due to the plurality of the Indonesian legal system and the formula of the inheritance exclusion rule, the incentives for son preference and high fertility are limited to Muslim couples in which the man had a surviving brother at the time of starting childbearing and who started childbearing before the compilation. Only in the pre-compilation period, different rules of allocation of inheritance wealth between nuclear and lateral family lines applied for Indonesian Muslim and non-Muslim populations, as well as for Muslim men who had a surviving brother and Muslim men who had no siblings or only sisters.

3. Empirical strategy

In what follows, I describe the main identification strategy and the data used in the analysis.

3.1. Identification

The cross-sectional and time variation in the application of inheritance rules in Indonesia offer an opportunity to identify the influence of the classic Islamic inheritance law on fertility preferences, behavior and outcomes. I adopt a difference-in-difference-in-differences (DDD) methodology and exploit variation across religious groups affected by different legal systems, across individuals with different sibling gender composition, and before and after the compilation of Islamic inheritance law. I estimate:

$$Y_i = \alpha_0 + \alpha_1 M_i + \alpha_2 S_i + \alpha_4 M_i S_i + \beta_0 T_i + \beta_1 M_i T_i + \beta_2 S_i T_i + \beta_3 M_i S_i T_i + \delta_0 N_i T_i + \delta_1 X_i T_i + \mu_i \quad [1]$$

Where Y_i is the ideal or actual proportion of sons or family size for couple i, M_i indicates whether the man in couple i is Muslim, S_i indicates whether he had at least one surviving brother, T_i indicates whether the couple started childbearing in the post-compilation period, N_i is a vector of fixed effect dummies for the men's total number of siblings, and X_i controls for other factors: the household wealth quintile, the man's

educational attainment, the educational attainment of his spouse and fixed effect dummies for the age of the mother and the year of first child birth. I also include fixed effect dummies for the area and region of residence to account for regional differences in the characteristics and the time of introduction of the Indonesian family planning program.[4] Finally, I cluster standard errors at the primary sampling unit (PSU) level and weight the regressions using survey weights.

For each outcome, I compare Muslim and non-Muslim couples in which the man has a surviving brother (first difference), relative to Muslim and non-Muslim couples in which the man has no siblings or only sisters (second difference), before and after the 1994 compilation (third difference). The first difference between Muslim and non-Muslim men who have one surviving brother cannot be causally attributed to the doctrine or to the inheritance rules that regulate each religious group. Single differences between Muslims and non-Muslims may be explained by differences in socio-economic conditions, female agency, age at marriage, and biological pre-natal factors or post-natal child mortality. However, differences in those contributing factors are expected to remain the same between Muslim and non-Muslim couples in which the man has no brothers. By subtracting the second difference from the first one, the effect of the Islamic inheritance law can be estimated. Only the application of the inheritance rule is assumed to vary between Muslim men who have at least a surviving brother and those who have no brothers. No difference by sibling composition is expected among non-Muslim men.

One could still argue that the differences in other contributing factors, between Muslim and non-Muslim men, are not the same for those who have no surviving brothers and those who do have a brother. A large literature has found significant effects of sibling sex composition and family size on adult outcomes, in both developed and developing

[4] The national family planning program was implemented in three stages; it was first introduced in the most populous provinces of Java and Bali and then spread to the remaining provinces. Moreover, since 2004, the National Family Planning Coordinating Board (BKKBN) was decentralized and has no longer authority over regional government's family planning policies and budgets (Cammack and Heaton 2001, Herartri 2008).

countries.[5] Moreover, in the setting I analyze, the sibling composition and size of the household of origin is not always random. As mentioned, a sub-group of Muslim couples has an incentive to produce a son so as to exclude other relatives from inheritance. Therefore, adult Muslim men who have a surviving brother and adult Muslim men who have only sisters or no siblings may come from nuclear and extended households that have different structures.[6] They may have different endowments or a preference for having sons that is independent of the incentive created by the inheritance rule. These differences by sibling composition are systematic and cannot be eliminated by a comparison relative to non-Muslim men as they do not have incentives to engage in strategic fertility behaviors.

Nevertheless, after subtracting the post-period difference between adult Muslim and non-Muslim men with different sibling composition from the pre-period difference, only the effect of the classical Islamic inheritance rule is expected to explain the differences in son-preference and fertility outcomes between Muslim and non-Muslim couples. Any alternative influences that remained after the second difference between adult Muslim and non-Muslim men are expected to stay fixed in the post-compilation period. Potential systematic gaps in the evolution of Muslim and non-Muslim adult and child mortality rates, contraceptive use and the like are eliminated by the third difference.[7]

3.2. Data

I use data on men and women's gender and fertility preferences, women's birth histories, and men and women's sibling histories from the 2007 Indonesian Demographic and

[5] For instance see Steelman et al. (2002), Butcher and Case (1994), Morduch (2000), Parish and Willis (1993).

[6] If the inheritance rule is binding, adult men who only have surviving sisters are more likely to be born in larger households and from parents who were practicing DSB and, and are more likely to have a male agnate uncle (brother of their father).

[7] Between 1987 and 2007, the total fertility rate declined from 3.3 to 2.6 children per woman; the infant mortality rate declined from 70 to 34 deaths per 1000 live births; the male (female) life expectancy at birth increased from 58 to 68 (62 to 72) years old; and the use of any (modern) method of contraception for women of reproductive age increased from 48 to 61 (44 to 57) percent (DHS 1987, 2007).

Health Survey (DHS).[8] Before 2007, the sibling history was collected only from female not from male respondents. The 2007 DHS surveys all ever-married women who are 15 to 49 years old and every third currently married man who is 15 to 54 years old. I limit the sample to the fertility preferences and histories of women whose partner has also been interviewed (7,792 couples). I exclude all mixed couples formed by one Muslim and one non-Muslim partner (0.79 percent of all observations). Indonesia has legal restrictions for inter-religious marriages and inter-religious couples are usually disqualified from Islamic inheritance (Buchanan 2010). I also exclude polygamous couples (1.3 percent of all observations) because the fertility of men who have multiple wives should be assessed across all wives, but only co-resident wives are interviewed. A final sample size of 7,657 couples and 20,145 child births is obtained.

In order to exploit the single cross-section of data available, I define pre- and post-compilation samples based on the year when the couples initiated child-bearing, and based on the year of birth of each child. I measure men and women's son and fertility preferences as the ideal proportion of sons and the ideal total number of children. The ideal proportion of sons is a lower boundary of the degree of son preference because "children of either gender" is counted in the denominator but not in the numerator. Further, I calculate the actual proportion of sons and the actual number of children ever born from women's birth histories. Since only single-marriage couples are included in the sample and only legitimate children can exclude male agnates, women's birth histories can be confidently used to analyze the effects of the inheritance rule. Finally, I obtain the men's total number of surviving siblings and an indicator for having at least one surviving brother nine months before the date of birth of each child ever born. If a brother was alive before or at the time of conception, even if he was dead at the time of birth, his presence could have influenced the decision to have a child. Appendix 1 provides summary statistics for the data.

[8] Information on fertility preferences includes the ideal number of sons, daughters, and children of either gender; ideal total number of children and desire for additional children. Birth histories report the total number of live births; the age, sex, and survival status of each child, and the age and year of death of the deceased children. Sibling histories give a detailed account of the survivorship of all of the live-born children of the respondent's mother (i.e., maternal siblings), the current age of surviving siblings, and the age at death and year of dead for deceased siblings.

4. Main results

Here I report and discuss main results from OLS estimations at the couple-level. In couple-level estimations, I compare couples who started childbearing before and after 1994. First, I test the effects of the Islamic inheritance exclusion rule on son and fertility preferences. Next, I determine whether couples who have stronger incentives for son-preference follow a fertility stopping behavior. As a last step, I examine whether couples who have incentives to seek having a son end up with larger families.

4.1. Effects on the ideal proportion of sons and the ideal number of children: Muslim vs. non-Muslim differentials in son and fertility preferences

I start by identifying the characteristics of couples who have a strong son preference. Specifically, I model the effects of the Islamic inheritance exclusion rule on women's and men's ideal proportion of sons as specified in eq. [1]. Muslim couples in which the man has at least one surviving brother and who started childbearing before 1994 are expected to desire having more sons. Therefore, I test for a positive coefficient on the double interaction $M_i S_i$ and a negative coefficient on the triple interaction $M_i S_i T$. The baseline group is non-Muslim couples in which the man has no surviving brothers at the time of first child birth and who started childbearing before the compilation.

Expressed son preference is common, with 71 percent of women and 68 percent of men reporting that they would desire at least half their children to be boys. Overall, women wanted 0.4 percent more sons and men wanted 9.6 percent more sons than daughters.[9] However, I find that the average ideal proportion of sons across all women and men is considerably balanced, 0.42 and 0.41 respectively.[10] Son preference is not general but focused in the group that was expected to have stronger motivations to seek a son.

[9] Women wanted at least 1.39 sons and 1.42 daughters. Men wanted at least 1.49 sons and 1.41 daughters.
[10] This may be explained in part by data construction. The survey asks for the number of children the couple desires to be boys, girls or any. The ideal proportion of sons is calculated as the ideal number of boys over total ideal number of children, including children of either gender. Women and men are similar in their preferences for total number of sons but differ in their preferences for children of any sex.

Muslim couples in which the man has at least one surviving brother are more likely to target sons than couples in which the man has no surviving brother. This is consistent with the inheritance exclusion rule.

In Table 1, Panel A, the coefficient on the double interaction of Muslim and having at least one surviving brother comes out as significant and with the expected sign in all regressions of women's ideal proportion of sons but marginally significant or insignificant in regressions of men's ideal proportion of sons. A possible explanation is that, before the compilation, women had stronger incentives than men to secure a son because widows could only exercise their inheritance rights if there was a surviving male descendant.

In estimates for the full sample of couples (col. 1 and 3), Muslim women who started childbearing before the compilation and whose husband had at least one surviving brother desired a 0.12 higher fraction of sons than similar non-Muslim women. As expected, after the change of Islamic inheritance law their ideal proportion of sons was revised downwards. The coefficient on the triple interaction indicates that Muslim women who started childbearing after the compilation and whose husband had at least one surviving brother desired a 0.13 lower fraction of sons relative to similar women who started childbearing in the pre-compilation period. Differences in men's son preference between Muslim and non-Muslim men who had at least one surviving brother were insignificant.

One concern in the full-sample analysis is that couples who started childbearing after 1994, couples who enter childbearing at later ages, and couples who are from later cohorts may have not yet completed fertility and may have different preferences from those who began childbearing earlier. However, I find similar patterns when I limit the sample to couples in which women are 40 years old or older (col. 2 and 4) and of couples who expressed no desire to continue having children or who are infertile or sterilized (not reported). These couples are assumed to have completed fertility.

In the completed fertility sample, the estimated difference in ideal fraction of sons between Muslim and non-Muslim women whose husband have a surviving brother is 0.17, larger than in the full sample. No significant changes in their stated preferences are observed after the reform. In the same sample, estimated differences between Muslim and non-Muslim men's ideal number of sons become significant, although they are smaller than those observed in women's preferences. Muslim men who have a surviving brother at the time of first child birth and who started childbearing before the compilation desire a 0.12 larger fraction of sons than comparable non-Muslim men. Their ideal fraction of sons declines substantially, by 0.72 in the post-compilation period.

My findings on the level dummies (not reported) suggest that once other inheritance motivations for son preference are controlled for, Muslim men and women desire the same or a smaller proportion of sons than non-Muslims. On the contrary previous studies agreed that son preference was generally strongest among Muslim couples. I also find evidence that couples in which the man has no surviving brother and couples who started childbearing after the compilation have stronger son preference. Therefore, the estimated effects of inheritance law on son preference cannot be explained by time trends or by systematic differences by religion or sibling composition.

Turning to the ideal number of children, there is no reason to expect Muslim couples to prefer larger families than non-Muslim couples, nor to expect the change in the Islamic inheritance law to have an effect on the ideal family size. Muslims may want a higher proportion of sons than non-Muslims at every size. A preference for a large family is not a requirement for son preference to influence the actual number of children.

In Table 1, Panel B, Muslim couples in which the man has at least one surviving brother are not more likely to prefer larger families than similar non-Muslim couples, and the change in the inheritance rule has no significant effect on the preferences for family size. Only when the sample is limited to couples in which the wife is 40 years or older it is possible to find that Muslim men who have a surviving brother and who started childbearing in the post-compilation period prefer significantly smaller families; they

want 6.9 fewer children than similar men who started childbearing in the pre-compilation period. Overall, men and women who started childbearing after 1994 had a preference for smaller families (4.3 and 2.5 fewer children), but no significant differences in women's ideal are found over time by husband's religion and sibling composition.

4.2. Evidence of sex-differential fertility stopping behavior: Muslim vs. non-Muslim differentials in the actual proportion of sons

In light of the influence of the Islamic inheritance rule on son and fertility preferences of Muslim couples, I explore its effect on the actual sex composition of children and fertility outcomes. The main theoretical effect of DSB at the couple-level is that the actual proportion of sons declines with family size (Clark 2000). This occurs because son-targeting couples are more likely to continue having children until they have a son. If a son arrives earlier the couple stops earlier and obtains a small family with a high ratio of boys to total children. Instead, if a son arrives later the couple continues bearing children, thus having a larger family with a lower fraction of boys. In the absence of DSB, the association between the gender composition and number of children would be insignificant because the gender of a child is random.

In order to detect differential stopping behavior, I estimate a regression of the actual proportion of boys on the total number of children ever born:

$$\pi_i = \sum \beta_k \eta_{ki} \qquad [2]$$

Where π_i is the actual proportion of sons ever born to couple i and η_{ki} are dummies indicating a family size of k. The omitted category is a family size of one child, for which the proportion of sons and daughters is expected to be balanced. Because the full effect of DSB does not become evident until couples have completed their families, I only show estimates for the sample of women who are 40 to 49 years old.

In Indonesia DSB is not observed for the aggregate population. In Table 2 col. 1, there is a negative but insignificant association between family size and the proportion of sons. This result is expected as only Muslims who are affected by the Islamic inheritance law have incentives to secure a son and to adopt sex-differential fertility stopping strategies to implement their preferences.

Then, in order to examine whether DSB is followed in response to inheritance motivations for son preference, I refine the previous basic test from eq. [2] to include all other controls from eq. [1]. In Table 2 col. 3, a significant negative association between the actual ratio of sons and the number of children ever born becomes evident. Conditional on being a Muslim couple in which the man has a surviving brother, small families have a significantly higher proportion of sons than larger families. The average fraction of boys among couples with one child is 0.65. Couples who stop after two children have a 0.15 lower fraction of sons; couples with 8 or more children have a 0.22 lower fraction of sons (23 and 34 percent smaller, respectively).

Within a given family size, the couples who have a higher proportion of sons are the same couples who have a strong son preference. Muslim couples in which the man has at least one surviving brother attain an insignificant 0.058 higher proportion of sons than similar non-Muslim couples. However, after the compilation, Muslim couples in which the man has a surviving brother exhibit a significant 0.60 lower proportion of sons compared to equivalent Muslim couples who started childbearing before the compilation. Estimates that include couples with incomplete fertility are largely consistent; similar in sign but smaller in magnitude and insignificant (not reported). There is no general association between time, religion or sibling composition and the actual proportion of sons. The effects are specific to the interactions defined by the inheritance exclusion rule.

In order to rule out alternative explanations I replicate the previous analysis without controls for the total number of children. If there were systematic variations in abortion, misreporting of girls or biological factors, the proportion of sons would be correlated with household characteristics. Otherwise, because the gender of a child is random, the

association between the characteristics of a couple and the proportion of sons ever born would be insignificant. DSB entails that only controlling for family size the gender of the child is not random and can be explained (Clark 2000). Consistently, in Table 2 col. 2, I find no association between the actual proportion of sons and the characteristics of couples with incentives for strong son preference. Without resorting to DSB, couples with incentives to have a son cannot affect the sex composition of their children. The finding confirms that no other influences are operative.

Finally, in comparison to the actual proportion of sons, no relationship exists between the ideal proportion of sons and the ideal number of children. In Table 2 col. 4 and 5, the coefficients on the family size dummies are insignificant (even positive in full sample estimates of women's preferences). Only the characteristics of the couples explain the ideal proportion of sons. This contrast offers additional evidence of differential stopping behavior. Couples cannot always attain their preferred sex composition. Muslim women wanted a higher proportion of sons but equal family size than non-Muslim women. Muslim men wanted a larger family but an equal proportion of sons than non-Muslim men. In practice, they attain a lower proportion of sons at greater family size. Instead, abortion allows for directly increasing the proportion of sons without increasing the total number of children. Pre-natal sex-selection would have produced a higher proportion of sons at every family size.

4.3. Effects on the total number of children and excess fertility: Muslim vs. non-Muslim differentials in actual fertility outcomes

It has been established that son preference is strongest among Muslim couples in which the man has a surviving brother and who started childbearing in the pre-compilation period. It has also been shown that these couples are more likely to engage in sex-differential fertility stopping behavior and to attain a higher proportion of boys. An additional consequence of DSB is that couples with strong son preference are more likely to exhibit high fertility. This is to be expected because son preference will induce them to exceed their ideal family size in their attempt to attain the target for boys.

Using eq. [1] I test the effects of the characteristics identified with the application of the inheritance exclusion rule on actual and excess fertility. I report results for the sample of women ages 40 to 49 years old, who are assumed to have finished childbearing. In Table 3 col. 1, I find no significant differences in the total number of children ever born to Muslim and non-Muslim couples in which the man has at least one surviving brother. Nevertheless, the average number of children born to Muslim couples significantly declines in the post-compilation period. Muslim couples in which the man has a surviving brother and who started childbearing in the post-compilation period have 3.11 fewer children relative to those who started childbearing before the change in the Islamic inheritance law.

Similarly, in the post-compilation period, Muslim couples for whom the exclusion rule would be binding are less likely to exceed men's ideal family size. In Table 3 col. 3, Muslim couples in which the man has a surviving brother are 0.88 less likely to have a number of children greater than the men's ideal if they started childbearing after the compilation. The result is outstanding considering that in the post-compilation period Muslim men who had a surviving brother also adjusted downwards their ideal family size (Table 1 col. 4). In contrast, in Table 3 col. 2, there are insignificant differences in the probability of exceeding women's ideal fertility between Muslims and non-Muslims, by sibling composition and over time. No significant effect of the inheritance rule on women's ideal family size was previously found (Table 1 col. 4).

A general decline in the total number of children and in the probability of exceeding ideal fertility was observed between the pre and post compilation period. However there are no general differences in total and excess fertility by religion or sibling composition (not reported). The only differences between Muslims and non-Muslims are those defined by the impact of the Islamic inheritance exclusion rule on couples in which the man has at least one surviving brother relative to couples in which the man has no siblings or only sisters.

Overall, the effect of the Islamic inheritance law on the actual proportion of sons and family size is less pronounced than its effect on son and fertility preferences. The contrast between the effects on ideal and actual outcomes indicates that preferences cannot be fully put into practice. A possible explanation is that at low fertility levels, a demand for sons is more difficult to implement without recurring to pre-natal sex selection. If the differential fertility stopping rule is such that restrictions on family size are more tightly enforced than the demand for boys, moderately low total fertility and moderately balanced sex ratios would be observed. In Indonesia, pre-natal sex selection and abortion are limited.[11] Furthermore, since the late 1960s, Indonesia has an aggressive population policy that promotes two-child families and enforces the use of modern and permanent contraceptive methods (IUD, ligations).[12] This may have significantly limited the couples' ability to implement their son preference using DSB strategies.

An additional contrast is that between the estimated effects of the inheritance exclusion rule at the family level and the aggregated outcomes in Indonesia. A moderate influence on the sex composition and the number children ever born to Muslim couples was detected. However, Indonesia stands out as a country with balanced sex ratios (1015 males per 1000 females of all ages) and moderately low fertility rate (2.6 children per woman in 2007).[13] Several factors contribute to this difference. To begin with, not all couples have incentives for son-preference. The Islamic inheritance law is binding neither for non-Muslim couples, nor for men who have no brothers, nor for couples who had no exposure to the pre-reform inheritance rule. In addition, it is know that DSB has no aggregate effect on the population sex composition and that it does not cause a noticeable increase in aggregate fertility rates. Across all parities the sex of a child is random and

[11] In Indonesia abortion is generally illegal; however, abortion is common. According to estimates derived from a sample of health care facilities, the annual abortion rate in Indonesia is 3.7 abortions for every 100 women of reproductive age. In Asia as a whole it is 2.9. Abortion clients are often married adults with unmet need for contraception. (Guttmacher Institute 2008, Utomo et al. 2001).

[12] A defining feature of the program has been the use of targets rather than a change in attitudes (Hull and Hull 1997, Cammack and Heaton 2001). The targets have encouraged compulsory measures, including the practice of forced long-term contraception and sterilization. In the 1970s, the military was recruited to get as many women as possible fitted with IUDs. In subsequent decades, couples have been coerced by a combination of bribes, threats, and punishments. (Warwick 1986, Hafidz et al. 1992).

[13] The sex ratio at birth and under 5 years old are slightly less balanced (1221 and 1076), as it would be expected (DHS 2007).

not all couples who practice son-preferred DSB end up with big families, some reach their desired number of sons early and stop early (Clark 2000). Finally, modern contraceptive use in Indonesia is important (54 percent of ever married women 15–49 years). Previous studies have found that use of contraceptive methods increases the enforcement of differential stopping and minimizes the effect of DSB on aggregate fertility (Basu and De Jong 2007).

5. Child-level evidence of sex-differential fertility stopping behavior

One concern addressed in the couple-level analysis was that some women may have not completed fertility. In addition, two other factors may bias downwards the couple-level results. First, the outcomes and preferences of couples who started childbearing before the compilation and continued after the compilation reflect the effect of both old and new inheritance regimes. Second, they may be affected by changes in the extended family structure, as the men's brothers who were alive when the first child was born may no longer be alive at the time of subsequent births. The combination of these influences would reduce a couple's incentive to seek a son. Therefore, the coefficients obtained at the couple level should be considered a lower boundary of the actual effect of the inheritance law and of the difference between Muslims and non-Muslims.

As a different approach, in this section I perform tests of sex-differential fertility stopping behavior and estimate the effects of the Islamic inheritance exclusion rule using child-level data. Son-targeting couples are more likely to continue childbearing if they have girls in the early parities. As a result, DSB has two important implications at the child level: boys have a smaller number of siblings and a higher relative order of birth than girls. Son and fertility preferences, child gender composition and complete family size cannot be examined using child-level data, but the effects of DSB at the child level have a bearing on fertility outcomes at the couple level.

In child-level regressions, I compare the number of siblings at birth and the relative birth order of girls and boys ever born, according to their parent's religion, their father's sibling composition and before and after 1994.[14] Child-level regressions allow accounting for the exact sibling composition of the father and the gradual adjustment of fertility outcomes in response to the changes in the inheritance law. I estimate a modified version of eq. [1], conditional on child gender as well as separately for boys and girls:

$$Y_i = \alpha_0 + \alpha_1 M_i + \alpha_2 S_i + \alpha_3 M_i S_i + \beta_0 T_i + \beta_1 M_i T_i + \beta_2 S_i T_i + \beta_3 M_i S_i T_i + \delta_0 N_i T_i + \theta_2 s_i + \theta_3 M_i s_i + \gamma_0 t_i + \gamma_1 M_i t_i + \gamma_2 s_i t_i + \gamma_3 M_i s_i t_i + \rho_0 n_i t_i + \delta_1 X_i T_i + \mu_i \quad [3]$$

In addition to T_i, S_i, N_i and their interactions evaluated at the time the couple started childbearing, eq. [3] includes an indicator t_i for whether the child was born after the compilation, s_i for whether the father has at least one surviving brother, and n_i for the father's total number of surviving siblings at the time of child birth. Finally, X_i includes fixed effects for both, the year the couple started childbearing and the year of birth of the child. The indicators evaluated at the time the parents started childbearing account for past conditions, which influenced the cumulative fertility outcomes. Meanwhile, the indicators at the time of child birth account for contemporaneous conditions, and help explain the progression in childbearing patterns.

In the regression of sibling-size, Table 4 col. 1, a negative coefficient on the indicator of whether the child is a boy is consistent with DSB. Instead, in Table 4 col. 2, a positive relationship between the relative birth order and the boy indicator was expected. Both coefficients are small and not significant. Boys do not have fewer siblings and are not born later relative to girls. In uncontrolled regressions, the coefficients are equally insignificant.

Conversely, conditional on child gender, Muslim children born in the post compilation period, whose father had a surviving brother at the time of child birth, have 0.33

[14] Following Basu and De Jong (2007), I calculate the relative birth order of a boy (girl) as the average position of male (female) children born within the family until the time of the boy (girl)'s birth.

significantly fewer older siblings and a 0.19 significantly lower order of birth than similar non-Muslim children born in the same year. Both findings point to post-compilation reductions in family size among Muslims affected by the exclusion rule. The results hold after accounting for general differences in religion, in father sibling composition and in the time the parents started childbearing. Differences in the number of siblings and order of birth between Muslim and non-Muslim girls are smaller and less significant than in the full sample (Table 4 col. 3 and 6); but the estimated effects of the inheritance rule remain comparable in magnitude and significance in the sample of male children (Table 4 col. 2 and 5).

An interesting contrast is that between the estimated effects of the inheritance rule operating at the time of child birth and at the time the couple started childbearing. Children born to men who had a surviving brother at the time of starting childbearing have more siblings and a higher order of birth if they are Muslim rather than non-Muslim; and significantly so if the parents started childbearing in the post-compilation period. The coefficients on the interactions evaluated at the time of the child birth have the opposite sign. Combined these results suggest that the effect of the inheritance exclusion rule persisted in the post-compilation period, but vanished as the time passed and as the father's sibling composition changed.

Finally, child-level regressions of the actual proportion of male children ever born on sibling size and on the interactions associated to the inheritance rule produce more significant estimates and have more explanatory power than analogous couple-level regressions. Col. 3 in both, Table 5 and Table 2, present similar evidence of DSB on the sample of (children born to) women who are 40 to 49 years old. Both describe a negative relationship between the actual proportion of sons and the indicators of family size, as well as a post-compilation decline in the proportion of male children among Muslim couples in which the man has a surviving brother. Nevertheless, in child-level regressions in Table 5, the estimated effects on sibling size are larger and more significant. Moreover, DSB can be detected in the full sample of children in spite of incomplete sibling size.

6. Effects on son and fertility preferences of couples by housing ownership status

A last question to consider is whether groups that do not have substantial assets or wealth exhibit the differential effects by religion, sibling composition and time that have been associated with the change in Islamic inheritance law. If son preference among Muslims is truly influenced by the Islamic inheritance exclusion rule, the effects observed among couples who have little or no estate should be small or insignificant.

In Indonesia, housing, land and durable goods are the most important assets in an individual's estate (Cammack 1999b). The 2007 DHS collects information on the ownership status of the dwelling unit and on the possession of durable goods, but not on land ownership or income. Land ownership can only be imperfectly inferred for men and women who worked in agriculture during the 12 months preceding the survey (25 and 39 percent of the sample, respectively). Only they were asked whether they worked on their own or someone else's land. Wealth quintiles are included in the dataset and are reported for all observations. However, they are constructed based on an index that aggregates household possessions, dwelling characteristics, source of drinking water and other measures. The elements of the index are possibly endogenous to the sex composition and size of the family.[15]

In order to maximize sample size and minimize potential endogeneity problems, I use the indicator of housing ownership in the analysis. Virtually all couples provide information on the tenancy status of their dwelling (99.6 percent of the sample). Although this indicator does not represent the economic conditions that prevailed when fertility decisions were made, it is a reasonable proxy. I compare the effects of the inheritance exclusion rule between couples who own and do not own housing. I follow the same specification described for the couple-level analysis of son and fertility preferences and fertility outcomes.

[15] Some durable goods, for instance tools or vehicles, may be a function of the total number of sons and may be used for production. Moreover, children may contribute to household wealth.

In Table 6, Panel A, I find that the effect of the Islamic inheritance law among non-homeowners is generally insignificant. There is only a marginally significant difference in Muslim women's ideal number of children between the pre- and post-compilation period, but the sign of the effect is wrong. Overall, the results provide evidence in support of the hypothesized null-effect of the Islamic inheritance exclusion rule on couples who do not have assets.

In contrast, in Table 6, Panel B, the effects estimated for the sample of home-owners are significant and of correct sign. In the sample of home-owners, as in previous estimates for the full sample, Muslim couples in which the man has a surviving brother at the time of starting childbearing desire a higher proportion of sons relative to similar non-Muslim couples (col. 1 and 2). Moreover, Muslim couples in which the man has a surviving brother and that starting childbearing in the post-compilation period desire a lower proportion of sons and fewer children, and attain a smaller number of children than similar couples before the compilation.

The expected effect of the inheritance rule across groups with different income level is more difficult to predict. One possibility is that low income couples are less affected by the inheritance motivation to have a son. Conversely, they may want to secure a son in order to gain access to their extended family's wealth. Alternatively, they could be exposed to greater expropriation risk by their extended family. Poorer couples may have few strategies available in order to protect their wealth. Instead, in addition to fertility strategies, richer couples may have better legal resources and better wealth and investment management strategies. Sample size constraints prevented me from exploring these potential effects separately for households in each income quintile. However, any of these possibilities would reinforce rather than reduce poorer couples' motivation to have a son. To the extent that the effects estimated on the sample of non-home owners were insignificant, we can trust that those factors have a small influence and are not a treat for identification.

7. Conclusions

In the study of fertility, it is reasonable to expect that differences among couples in their preferences for children contribute to differences in their fertility behavior. Religious affiliation is frequently considered a cultural factor that directly influences the formation of preferences for children, family size and contraception. However, in the Islamic world, the influence of religion extends beyond the doctrinal teachings into the specification and legal regulation of marriage practices and family relations, including inheritance.

In this paper, I provided empirical evidence of the role of the Koranic inheritance principles in the demand for children. A specific legal implication of these principles is the inheritance exclusion rule that in the absence of a son, the full balance of the estate goes to deceased's brother or the nearest adult male agnate. As a result, having a male sibling increases the cost of not having a son.

Estimates obtained for Indonesia suggest that son preference and high fertility among Muslim couples may arise from incentives to exclude the extended family from inheritance wealth. I found that Muslim couples in which the man has a surviving brother desire and effectively attain a higher proportion of sons. In an effort to have sons they follow a sex-differential fertility stopping behavior, exceed their ideal fertility and end up with larger families. The son preference and fertility of Muslim couples declined after Indonesia extended exclusion rights to daughters and gave them priority over the deceased's male relatives.

My study contributes to the literature by identifying an economic source of differences in fertility behavior between Muslim and non-Muslim populations. Previously only proximate determinants were examined, but underlying inheritance motivations for son preferences and fertility outcomes of Muslim populations were less explored. From a policy point of view, the results of this study are of interest because, in contrast with religious beliefs, Islamic inheritance laws can be directly modified through policy interventions. The study has implications not only for Muslim countries, but for non-

Muslim countries that leave to Islamic tribunals the regulation of Muslim minorities (India, Pakistan, Bangladesh, Egypt), and countries that are considering recognizing the authority of religious tribunals (U.K., Canada).

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Table 1: Effect of the Islamic Inheritance Rule on the Ideal Proportion of Sons and the Ideal Number of Children

	(1)	(2)	(3)	(4)
	Dependent Variable:			
	Women's Stated Ideal		Men's Stated Ideal	
Panel A: Ideal Proportion of Sons				
Muslim* At least one brother at childbearing	0.12**	0.17**	0.073	0.12*
	(0.042)	(0.058)	(0.040)	(0.055)
Muslim * At least one brother at childbearing * Childbearing after 1994	-0.13*	-0.060	0.043	-0.72***
	(0.052)	(0.21)	(0.076)	(0.21)
Mean, ideal proportion of sons	0.41	0.40	0.38	0.36
R-squared	0.07	0.10	0.08	0.14
Observations	6419	1614	6530	1671
Panel B: Ideal Number of Children				
Muslim* At least one brother at childbearing	-0.022	-0.012	0.36	0.45
	(0.27)	(0.42)	(0.30)	(0.46)
Muslim * At least one brother at childbearing * Childbearing after 1994	0.042	-0.51	-0.28	-6.89***
	(0.31)	(1.16)	(0.34)	(1.08)
Mean, ideal number of children	2.84	3.06	3.02	3.24
R-squared	0.18	0.24	0.19	0.22
Observations	6419	1614	6530	1671
Sample	All couples	Wife age 40 to 49	All couples	Wife age 40 to 49

* p<0.05, ** p<0.01, *** p<0.001.

Note: OLS estimates of interactions between indicators of Muslim religion, having at least one surviving brother at the time of first child birth, and starting childbearing in the post-compilation period. Parentheses contain standard errors clustered at the PSU-level. Regressions use survey weights. Baseline sample excludes mixed-religion and polygamous couples. Columns (1) and (3) report estimated coefficients for the full baseline sample; columns (2) and (4) report estimated coefficients for a subsample of couples in which women are 40 to 49 years old. All regressions include fixed effects for the men's total number of siblings, women's age, the year of first child birth, and area and region of residence. Other controls included are men and women's educational attainment and indicator of household wealth. Data summary is provided in Appendix 1.

Table 2: Sex-Differential Fertility Stopping Behavior and Effect of the Islamic Inheritance Rule on the Actual and Ideal Proportion of Sons

	(1)	(2)	(3)	(4)	(5)
	Dependent Variable:				
	Actual Proportion of Sons Ever Born			Ideal Proportion of Sons	
				Women's Ideal	Men's Ideal
2 Children	-0.13		-0.15*	0.0021	-0.22
	(0.077)		(0.072)	(0.18)	(0.16)
3 Children	-0.12		-0.16*	-0.089	-0.26
	(0.074)		(0.072)	(0.18)	(0.16)
4 Children	-0.14		-0.18*	0.0047	-0.26
	(0.075)		(0.071)	(0.18)	(0.16)
5 Children	-0.13		-0.18*	-0.067	-0.32
	(0.074)		(0.072)	(0.18)	(0.16)
6 Children	-0.14		-0.20**	-0.072	-0.33*
	(0.078)		(0.076)	(0.18)	(0.16)
7 Children	-0.15*		-0.21**	-0.16	-0.28
	(0.074)		(0.076)	(0.19)	(0.18)
8 Children	-0.15		-0.22**	0.051	-0.35*
	(0.077)		(0.077)	(0.18)	(0.17)
Muslim* At least one brother at childbearing		0.054	0.058	0.17**	0.13*
		(0.068)	(0.066)	(0.061)	(0.054)
Muslim * At least one brother at childbearing * Childbearing after 1994		-0.47	-0.60*	-0.13	-0.93***
		(0.26)	(0.29)	(0.21)	(0.22)
Mean, dependent variable	0.52	0.52	0.52	0.40	0.36
Mean, dependent variable if 1 child	0.65	0.65	0.65	0.44	0.44
R-squared	0.01	0.08	0.10	0.13	0.16
Observations	1931	1931	1931	1614	1671
Sample	Wife age 40 to 49	Wife age 40 to 49	Wife age 40 to 49	Wife age 40 to 49	Wife age 40 to 49

* p<0.05, ** p<0.01, *** p<0.001.

Note: OLS estimates of interactions between indicators of Muslim religion, having at least one surviving brother at the time of first child birth, and starting childbearing in the post-compilation period. Parentheses contain standard errors clustered at the PSU-level. Regressions use survey weights. Baseline sample excludes mixed-religion and polygamous couples. Columns (1) to (5) report estimated coefficients for a subsample of couples in which women are 40 to 49 years old. All regressions include fixed effects for the men's total number of siblings, women's age, the year of first child birth, and area and region of residence. Other controls included are men and women's educational attainment and indicator of household wealth. Data summary is provided in Appendix 1.

Table 3: Effect of the Islamic Inheritance Rule on the Total Number of Children Ever Born and Excess Fertility

	(1)	(2)	(3)
	Dependent Variable:		
	Actual Number of Children Ever Born	Dummy of Fertility in Excess of Women's Ideal	Dummy of Fertility in Excess of Men's Ideal
Muslim* At least one brother at childbearing	-0.059	-0.00073	-0.048
	(0.60)	(0.12)	(0.15)
Muslim * At least one brother at childbearing * Childbearing after 1994	-3.11*	-0.50	-0.88**
	(1.48)	(0.31)	(0.28)
Mean, dependent variable	3.79	0.38	0.39
R-squared	0.26	0.08	0.10
Observations	1931	1614	1673
Sample	Wife age 40 to 49	Wife age 40 to 49	Wife age 40 to 49

* p<0.05, ** p<0.01, *** p<0.001.

Note: OLS estimates of interactions between indicators of Muslim religion, having at least one surviving brother at the time of first child birth, and starting childbearing in the post-compilation period. Parentheses contain standard errors clustered at the PSU-level. Regressions use survey weights. Baseline sample excludes mixed-religion and polygamous couples. Columns (1) to (3) report estimated coefficients for a subsample of couples in which women are 40 to 49 years old. All regressions include fixed effects for the men's total number of siblings, women's age, the year of first child birth, and area and region of residence. Other controls included are men and women's educational attainment and indicator of household wealth. Data summary is provided in Appendix 1.

Table 4: Effect of the Islamic Inheritance Rule on Child-Level Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent Variable:					
	Number of Older Siblings Ever Born			Relative Order of Birth		
Boy	-0.019			-0.028		
	(0.024)			(0.021)		
Muslim* At least one brother at child birth	-1.92	-1.60*	-2.19	-0.82	-0.51	-1.04
	(1.05)	(0.79)	(1.24)	(0.55)	(0.42)	(0.70)
Muslim * At least one brother at child birth* Child birth after 1994	-0.33**	-0.38**	-0.27*	-0.19**	-0.18*	-0.19*
	(0.11)	(0.13)	(0.13)	(0.064)	(0.089)	(0.088)
Muslim* At least one brother at childbearing	1.49	1.10	1.81	0.53	0.12	0.87
	(1.06)	(0.81)	(1.25)	(0.55)	(0.44)	(0.72)
Muslim * At least one brother at childbearing * Childbearing after 1994	0.91***	0.99***	0.82*	0.54***	0.56**	0.51*
	(0.26)	(0.28)	(0.35)	(0.16)	(0.20)	(0.22)
Mean, dependent variable	2.38	2.36	2.40	1.90	1.88	1.92
R-squared	0.53	0.53	0.54	0.49	0.48	0.50
Observations	20090	10538	9552	20090	10538	9552
Sample	All children	Boys	Girls	All children	Boys	Girls

* p<0.05, ** p<0.01, *** p<0.001.

Note: OLS estimates of interactions between indicators of Muslim religion, having at least one surviving brother and whether birth occurred in post-compilation period, evaluated at both the time the couple started childbearing and the time of child birth. Parentheses contain standard errors clustered at the PSU-level. Regressions use survey weights. Baseline sample excludes children born to mixed-religion and polygamous couples. Columns (1) and (4) report estimated coefficients for the entire sample of children conditional on child gender. Columns (2) and (5) report estimates for a sample of boys only; and columns (3) and (6) for a sample of girls only. All regressions include fixed effects for the men's total number of siblings at the time the couple started childbearing and at the time of child birth, the year of first child birth, the year of birth of the child, the women's age, and area and region of residence. Other controls included are men and women's educational attainment and indicator of household wealth. Data summary is provided in Appendix 1.

Table 5: Sex-Differential Fertility Stopping Behavior and Effect of the Islamic Inheritance Rule: Child-Level Estimates

	(1)	(2)	(3)	(4)
	Dependent Variable: Actual Proportion of Sons Ever Born up to Child's Birth			
2 Children	-0.25***	-0.25***	-0.26***	-0.27***
	(0.0080)	(0.0083)	(0.014)	(0.032)
3 Children	-0.31***	-0.31***	-0.31***	-0.29***
	(0.0091)	(0.011)	(0.016)	(0.034)
4 Children	-0.36***	-0.36***	-0.36***	-0.36***
	(0.012)	(0.016)	(0.020)	(0.039)
5 Children	-0.38***	-0.38***	-0.39***	-0.36***
	(0.014)	(0.018)	(0.025)	(0.036)
6 Children	-0.41***	-0.41***	-0.41***	-0.39***
	(0.020)	(0.023)	(0.029)	(0.045)
7 Children	-0.42***	-0.42***	-0.45***	-0.43***
	(0.023)	(0.028)	(0.034)	(0.048)
8 Children	-0.45***	-0.46***	-0.48***	-0.46***
	(0.032)	(0.037)	(0.044)	(0.072)
Muslim* At least one brother at child birth		-0.078	-0.12	-0.11
		(0.080)	(0.11)	(0.18)
Muslim * At least one brother at child birth* Child birth after 1994		-0.042*	-0.049	-0.12*
		(0.021)	(0.033)	(0.048)
Muslim* At least one brother at childbearing		0.13	0.14	0.22
		(0.082)	(0.12)	(0.18)
Muslim * At least one brother at childbearing * Childbearing after 1994		0.047	-0.38***	-0.48***
		(0.043)	(0.087)	(0.14)
Mean, dependent variable	0.81	0.81	0.77	0.69
R-squared	0.41	0.42	0.39	0.25
Observations	20136	20090	7671	1931
Sample	All children	All children	Mother age 40 to 49	Last child and no desire for more

* p<0.05, ** p<0.01, *** p<0.001.

Note: OLS estimates of interactions between indicators of Muslim religion, having at least one surviving brother and whether birth occurred in post-compilation period, evaluated at both the time the couple started childbearing and the time of child birth. Parentheses contain standard errors clustered at the PSU-level. Regressions use survey weights. Baseline sample excludes children born to mixed-religion and polygamous couples. Columns (1) and (2) report estimated coefficients for the entire sample of children. Columns (3) reports estimates for a sample of children born to women who are 40 to 49 years old; and column (4) for the last children born to women who have no desire or who cannot continue childbearing. All regressions include fixed effects for the men's total number of siblings at the time the couple started childbearing and at the time of child birth, the year of first child birth, the year of birth of the child, the women's age, and area and region of residence. Other controls included are men and women's educational attainment and indicator of household wealth. Data summary is provided in Appendix 1.

Table 6: Effect of the Islamic Inheritance Rule on Fertility Preferences and Outcomes of Couples who Own and do not Own Housing

	(1)	(2)	(3)	(4)	(5)
	Dependent Variable:				
	Women's Ideal Proportion of Sons	Men's Ideal Proportion of Sons	Women's Ideal Total Number of Children	Men's Ideal Total Number of Children	Actual Number of Children Ever Born
Panel A: Sample of couples who do not own housing					
Muslim* At least one brother at childbearing	0.15	0.077	-0.65	-1.33	-0.64
	(0.084)	(0.14)	(0.83)	(1.04)	(1.33)
Muslim * At least one brother at childbearing * Childbearing after 1994	-0.093	-0.47*	3.81*	-4.06	-4.97
	(0.31)	(0.20)	(1.63)	(2.85)	(3.07)
Mean, dependent variable	0.42	0.33	3.19	3.52	3.77
R-squared	0.33	0.44	0.47	0.47	0.47
Observations	249	258	249	258	296
Panel B: Sample of couples who own housing					
Muslim* At least one brother at childbearing	0.17**	0.13*	-0.030	0.77	0.038
	(0.063)	(0.061)	(0.45)	(0.52)	(0.62)
Muslim * At least one brother at childbearing * Childbearing after 1994	-0.73**	-0.92***	1.61	-5.23***	-3.38*
	(0.24)	(0.26)	(0.97)	(0.95)	(1.48)
Mean, dependent variable	0.39	0.36	3.05	3.20	3.79
R-squared	0.11	0.14	0.25	0.22	0.27
Observations	1358	1405	1358	1407	1626
Sample	Wife age 40 to 49	Wife age 40 to 49	Wife age 40 to 49	Wife age 40 to 49	Wife age 40 to 49

* p<0.05, ** p<0.01, *** p<0.001.

Note: OLS estimates of interactions between indicators of Muslim religion, having at least one surviving brother at the time of first child birth, and starting childbearing in the post-compilation period. Parentheses contain standard errors clustered at the PSU-level. Regressions use survey weights. Baseline sample excludes mixed-religion and polygamous couples. Columns (1) to (3) report estimated coefficients for a subsample of couples in which women are 40 to 49 years old. All regressions include fixed effects for the men's total number of siblings, women's age, the year of first child birth, and area and region of residence. Other controls included are men and women's educational attainment and indicator of household wealth. Data summary is provided in Appendix 1.

Appendix 1: Descriptive Statistics Couple-Level Data

	Mean	Std dev
Religion		
Fraction of Muslim couples	0.78	
Men's sibling composition at time of first child birth		
Fraction of men who have at least one living brother	0.80	
Men's average total number of living siblings	3.97	
Year of first child birth		
Fraction of couples with first birth in 1975-1979	0.039	
Fraction of couples with first birth in 1980-1984	0.10	
Fraction of couples with first birth in 1985-1989	0.14	
Fraction of couples with first birth in 1990-1994	0.18	
Fraction of couples with first birth in 1995-1999	0.20	
Fraction of couples with first birth in 2000-2004	0.22	
Fraction of couples with first birth in 2004-2007	0.11	
Fertility preferences and actual outcomes		
Women's ideal proportion of sons	0.42	[0.21]
Women's ideal number of sons	1.23	[0.86]
Women's ideal number of daughters	1.22	[0.85]
Women's ideal number of children	2.96	[1.29]
Men's ideal proportion of sons	0.41	[0.24]
Men's ideal number of sons	1.28	[1.02]
Men's ideal number of daughters	1.18	[0.94]
Men's ideal number of children	3.14	[1.47]
Couple's actual proportion of ever-born sons	0.52	[0.36]
Couple's actual number of ever-born children	2.54	[1.80]
Couple's actual proportion of living sons	0.52	[0.36]
Couple's actual number of living children	2.33	[1.57]
Other controls		
Fraction of couples residing in urban area	0.41	
Women's average education level	2.65	[1.34]
Men's average education level	2.82	[1.34]
Women's average age	33.1	[8.06]
Men's average age	37.1	[8.29]
Couple's average wealth quintile	2.89	[1.47]

Source: Indonesian 2007 Demographic and Health Survey (DHS).
Note: Education level is defined as 0=no education, 1=incomplete primary, 2=complete primary, 3= incomplete secondary, 4=complete secondary, 5=higher.